Energy Facts

Photo credit: Ausra

Compact Linear Fresnel Reflector (CLFR) Solar

CLFR technology is similar to solar trough technology. Sunlight is reflected by a series of mirrors onto a receiver tube, thus CLFR, like solar trough, is a linear line concentrator. Instead of using a parabolic shaped mirror, however, the "parabola" in CLFR is divided into ten flat mirrors that each rotate to follow the sun. This arrangement enables the mirrors to remain near the ground to avoid wind loads, and avoids the higher costs of both the curved mirrors and the specialized receiver tubes of trough systems. The receiver tubes in the case of CLFR contain water, and the plant creates saturated steam at about 545ºF that drives a turbine to generate electricity.

History:
The CLFR technology is being promoted by Ausra, which is headquartered in Palo Alto, CA. Ausra has a prototype plant running in Australia and another scheduled to come online near Bakersfield in about May 2008. They have signed an agreement with Pacific Gas & Electric for a 177 MW plant on private land in the Carrizo Plain that is expected to begin energy production in 2010. Other companies have experimented with this technology in Europe. Ausra claims that it will soon be selling power from its plants at $.104/kWh, although it has not yet constructed a utility-scale plant.

Land Use:
CLFR technology requires level land, with less than 1 percent slope desirable, and sites are typically graded. Ausra's 177 MW plant will fit on a 1 square mile parcel of land in the Carrizo Plain, which does not have the highest quality solar resource in CA. This equates to less than 4 acres/MW of capacity. CLFR's land requirement is slightly less than trough plants because more surface area of the ground can be covered with mirrors.[1]

For more information:

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CLFR Compact Linear Fresnel Reflector Solar

Photo credit: Ausra

Water Use:
As with any technology using steam turbines, CLFR plants require water to generate the steam which powers the turbine to produce electricity. This water circulates in a closed loop, but some "make-up" water is required to replace water lost in the system. If wet cooling is used, water is also required for the cooling towers and consumption is similar to conventional steam plants. However, dry cooling has been proposed for the Carrizo Energy solar farm. Some water is also required to wash the mirrors. Ausra has requested a permit for 21.8 acre-ft/year of water for its dry-cooled Carrizo plant, which amounts to 12.3 acre-ft/year per 100 MW.[2] By comparison, the square-mile section of land occupied by the Carrizo Energy Solar Farm will receive approximately 500 acre-ft of rainfall annually.[3] One acre-ft/year of water is enough for three to six families in California.

[1]Application for Certification for Carrizo Energy Solar Farm. California Energy Commission. 10-25-07. Available at: http://www.energy.ca.gov/sitingcases/carrizo/index.html
[2]Ibid.
[3] Calculation based on average annual rainfall of 9.7 inches at Cavanaugh Ranch, 1938-1982.

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